

# SCIENCE.

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FRIDAY, MAY 7, 1886.

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## COMMENT AND CRITICISM.

THE STATEMENTS of the report and conclusions of Mr. Allison's commission, which have appeared in the public prints, and were partially reproduced in our last number, we learn, on good authority, to be premature in several respects. The fact is, that the commission has not finally formulated either a bill or a report, and may not do so for a week or more. What it has done is to vote on certain general conclusions; to direct its members to draw up reports expressing the views of the commission, or those of the individual members, on points in which they were a minority; to authorize the members to introduce bills expressing their individual views; and to remove the seal of secrecy from the proceedings. In reaching general conclusions, the commission, by a vote of four to two, decided to make no change in the coast survey, and it is not even believed that any legislation defining its work will be formally recommended. The members are unanimously of opinion that the policy of the signal office should be moulded with a view of erecting it, at no distant day, into a civil bureau, but on the question of making the change immediately they are equally divided. They are opposed to the school of instruction at Fort Myer, as now conducted, and, it is said, to what is known as the study-room in Washington. In the matter of the geological survey, they are of opinion that its operations should be restricted by law in the direction indicated by Mr. Herbert's bill, mentioned in our last number, but are not yet agreed upon all details.

All parties will agree that this is a very lame conclusion of two years of such careful investigation as has been bestowed upon this subject by the commission. The only parties that can be pleased are those who, knowing how broad and easy is the road to bad legislation, and how narrow the path to that which is good, will be grateful that more harm has not been done. The most curious feature of the conclusion is, that the complaints which gave rise to the investigation appear

to have been only lost sight of; and the only organization which comes in for serious condemnation is one against the integrity of which no charge has ever been made, except to be refuted. It is now conceded by all disinterested parties, including the members of the commission, that the geological survey has been conducted with the highest ability and integrity, and in accordance with the laws making the appropriations for its support. The ground of complaint is, that it has undertaken too wide a range of geological and allied investigation, not pertaining to its proper functions; that it has secured political support by employing a large body of scientific men scattered over the country in these investigations, and has put the government to great expense in printing the results of such work. Paleontological research seems to have come in for the largest share of condemnation; mainly, we suppose, on the authority of Professor Agassiz, who claims that such research is not a proper function of public geological survey.

On the merits of so broad a question as this, including innumerable details within its scope, it would be unwise to pass a summary judgment. The views expressed in Mr. Herbert's report form, however, a legitimate subject of examination. If correctly reported in the public prints, they are not characterized by judicial impartiality and fairness of statement. For example: he gives what professes to be an exhibit of the cost of the geological surveys in nearly a dozen different countries, so widely separated as Canada, Japan, and Victoria, without any statement of the considerations which determine their selection, and finds that the aggregated cost does not exceed that of our own geological survey. But he gives no definition of the objects and limitations of these various surveys with a view of determining to what extent they are identical with our own. We believe, that, as a matter of fact, the geological survey of England has been completed for some time, and that the work now done, on the small cost of which Mr. Herbert lays stress, is not properly a survey at all. An advocate of the other side might with equal fairness have taken the cost of all the surveys now in progress in

England, and shown that that country alone appropriates twice as much for its surveys as we do. Again, a list is given of some seventy persons having other employments; most of them being college professors, who have been employed by the geological survey. The report fails to state that this list is in no way a list of employees, but a complete list of persons who at some past time have received one or more payments from the survey, for some special service rendered, without being in any way permanently connected with it or salaried by it. It is clear that a final conclusion cannot be drawn from statements like this until the other side is heard.

IN THE JANUARY NUMBER of the *Nineteenth century*, Mr. Frederic Harrison published an article on the practice, now so common, of spelling foreign and ancient names as they are spelled in the original tongues, even in cases where an anglicized form of the name has been long in use. He spoke particularly of the re-writing of familiar Greek names in conformity with the original spelling, and also of the names of persons and places in the earliest history of England. This practice he characterizes as 'a pedantic nuisance,' and makes some very good points against it. He remarks that "'Alfred,' 'Edward,' and 'Edgar' are names which for a thousand years have filled English homes and English poetry and prose. To re-write these names is to break the tradition of history and literature at once;" and he speaks in the same way of the re-writing of familiar Greek names. He also asks where the practice is going to stop, and thinks "we shall soon be invited to call 'Moses,' 'Môsheh,' as his contemporaries did; 'Judah' should be written Yehûda; 'Jacob' will be 'Ya'aqôb;' and 'Jesus' will be 'Jehoshua.' In short, Mr. Harrison condemns the practice in unqualified terms, on the ground that it violates the established usage of English literature without conferring any compensatory benefits.

To this article of Mr. Harrison's, Mr. E. A. Freeman has replied in the April number of the *Contemporary review*. Mr. Harrison had spoken of Mr. Freeman as one of the worst offenders in the matter in question, and the historian's reply is little else than a personal vindication of himself. Viewed in this light, his article is more or less successful, and he convicts his opponent of

some mistakes and inaccuracies. But, as a defence of the practice that Mr. Harrison condemns, we are obliged to say that Mr. Freeman's reply is unsatisfactory. Indeed, he doesn't argue the main question at all, but treats the matter as little more than a personal affair between himself and Mr. Harrison. This is disappointing; for the question involved is one that greatly needs a final settlement, and such a settlement can only be reached on some ground of principle. The question is, whether we are to write all foreign names as they are written in the original languages; and, if not, then what ones we are to write in that way, and what ones are to be anglicized. Mr. Harrison shows that the writers he criticises are not at all consistent with themselves; and Mr. Freeman virtually admits that his own practice is not consistent, and that he doesn't follow any general rule. He says that he writes 'Aelfred' and 'Eadward' because he finds these names so written in the ancient authorities; but, nevertheless, he writes 'Rochester' and 'Canterbury,' although the old forms of these names are 'Hrofoesceaster' and 'Cantwarabyrig.' He says, too, that he writes 'Buonaparte,' pronouncing the word in four syllables, for the reason that he learned to do so in his childhood, which strikes us as no reason at all. We hoped, when we took up Mr. Freeman's article, to find him laying down some definite rule or principle which might serve as a guide to all writers in this perplexing matter; and we are disappointed at finding that he does not even attempt to do so.

STORIES OF THE OCCURRENCE OF PETRIFIED FLESH, or of frogs and toads enclosed in solid rock, and other fables of the same nature, frequently appear in the daily and weekly papers. One not dissimilar, though vastly more absurd, of the finding of two living bats embedded in a solid lump of bituminous coal, from a coal-mine in Maryland, is now going the rounds, and will probably not rest till the press from Maine to California has given publication to it. There was said to have been no crevice admitting the entrance of these wonderful bats, and that there was a clearly formed impression left by them. The inference, no, the only 'conclusion,' is, that these hoary chiropterans are living remnants of the coal-forming age. It was not long ago that just such a story was told of an ancient toad in another coal-mine, only this time the carboniferous

batrachian had become, as was naturally expected, very much desiccated. It is very strange with what persistence such myths and fables retain their hold on popular credence. Men of high intelligence will aver their belief in petrified human bodies, and we have known a shrewd business-man to exhibit what he firmly believed was a large mass of fossil buffalo flesh, sinews, muscles, blood and all. What more natural thing could there be than the finding of a toad or bat, dead, hibernating or active, in the crevices of a coal-mine? and yet, doubtless, to one wholly unacquainted with geological and zoölogical principles, a carboniferous fossil fish or living bat seems equally inexplicable and wonderful. Such fanciful flights of imagination might pass unnoticed, were they not so industriously circulated in the columns of even the highest class of metropolitan newspapers.

#### *THE COAST SURVEY AND THE NAVY.*

THE latest argument for the transfer of the coast survey to the navy department is embodied in a paper by Lieutenant Dyer, U. S. N., recently published in the Proceedings of the U. S. naval institute. A very slight examination of this production shows that the author travels over an easy and well-trodden path instead of grappling with the real difficulties of the question. Nothing is easier than to demonstrate to the satisfaction of any writer who chooses to espouse the cause, that the coast survey ought to be turned over to the navy department. If nothing more were necessary than a "Be it enacted, etc., that the hydrographic work of the coast survey shall be transferred to the navy department," the problem would be a very simple one. It is to this simple form of it that all the arguments heretofore brought forward by the navy department have been directed.

Fault can be found with every system of public administration; and the thought, "How much better we could manage things if congress would put us in charge of them!" will be prevalent so long as human nature remains as it is. The real difficulties of the question begin when we attempt to decide just what work, what records, and what appliances shall be transferred to the navy department, and how the navy department shall utilize the appliances and carry on the work. One difficulty met with at the very start is found in that custom of the naval service which requires

that almost every officer, certainly every young and energetic officer, shall change his duty at the end of every three years. Howsoever well a cadet at Annapolis may be trained in the theory of marine surveying, he cannot possibly acquire at the academy that experience in practical work of any kind which is necessary to its effective prosecution. His first year, perhaps his first two years, in the work of the survey, would be very largely taken up in learning how to do it, so that he would hardly have become an expert before he must leave to keep watch on board a ship of war. Of course, we refer here to the more difficult and technical work of chart-construction, and not to such matters as running a line of soundings. It would therefore be a necessity of the service that a permanent corps of skilled map-makers should be organized, or that a part of the existing corps should be transferred. Even then it would be contrary to naval custom to allow these civilian assistants to hold any other than subordinate positions; and all branches of the direction, from the head of the office down, would be intrusted to men who were continually changing.

This is a consideration which would have to be kept in view in deciding what work should be transferred. One important function of the survey is the study of the effect of tidal and other action upon harbors. We all know that most of our harbors are in a continual state of change; and the study of the causes of such changes can be effectively prosecuted only by experts who make it a considerable part of the business of their lives. Can the navy be relied upon to furnish such experts? Tidal observations at numerous points along the coast form an essential part of the work. Will they be effectively kept up under the continual changes of naval administration? Can the records of the coast survey which pertain to hydrography be separated from the others and transferred to another department without any inconvenience? If not, can the navy department get along without them, and not waste labor in repeating work already done? Can a portion of the draughtsmen and engravers be transferred, or must new men be employed in their places?

We suggest these questions, not claiming that their solution presents insurmountable difficulties, but only as showing where discussions should be directed in order to be effective. Such general considerations as Secretary Chandler and the naval officers have presented on the subject may be very

effective in starting people to think about it, but can never suffice to show what policy should be adopted. To demonstrate what ought to be done is one thing; but to show how to do it is, as all practical men know, a very different and generally a much more difficult thing. We hope, therefore, that if our naval friends, for whose professional ability *Science* entertains the highest respect, really desire the transfer, they will present such a detailed plan of proceeding from beginning to end, that every one shall be able to understand and criticise it. Until they do this, they must not expect to excite congress to action.

We may add one general consideration. A considerable number of naval officers are actually engaged in coast-survey work. Is not their work as effectively performed under the present system as it would be if the navy department had charge of it? What would the officers themselves, or the navy at large, gain by the transfer? We are aware that Secretary Chandler considered it a very great hardship that officers should be removed from the immediate control of the department to which they belong. But where does the real evil come in? These questions must be answered, and the public benefit to be gained by the change must be made clear, before the project can receive the really effective support of scientific men. The latter are not disposed to prejudge the question, but before supporting the measure they want to be satisfied of its practical advisability; and this can be done only by the advocates of the change fully considering such questions as those above suggested.

#### COMPOSITE PORTRAITS OF AMERICAN INDIANS.

ON the plate accompanying this number is given, so far as known, the first presentation of composite portraits taken of North American Indians.

No. 1 is of three full-blood Dakota or Sioux young women belonging to the band commonly known as the Brulé, and living at the Crow Creek agency, Dakota territory. Their ages range from nineteen to twenty-three years. Their average height is five feet six inches and a half; their average weight, a hundred and forty-one pounds. This composite is made from photographs taken on the same day and in rapid succession. On the same afternoon, composite No. 2 was taken from the same persons, each one sitting her allotted seconds before the camera. In No. 1 and No. 2 the order of the faces is identical, and care was exercised to try and procure similar results in

the portrait; but, as will be observed, the composites are different. The controlling face in No. 1 is given in picture No. 3, which was the first photograph to be exposed in making up composite No. 1. The dominant face in No. 2 is given in picture No. 4. It belonged to the last sitter, and her photograph was the last one exposed in making composite No. 1. In two composites similarly made, of Omaha women, the one from sitters varies in a like manner from the one made up from photographs, only in a different order. In the one from life the broad face of the last sitter controls the composite, and in the other the long face of the first photograph influences the picture. This variation of composites made from the same faces—one taken from life, the other from photographs—is mentioned for what it may be worth.

A composite of Omaha men, a cognate tribe, differs but little from a Dakota composite, except in the eyes. In the Omaha composite the eyes are larger and fuller. The height and breadth of head, the strong but not unduly heavy lower face, are noticeable in both Omahas and Dakotas. A composite of Omaha women does not differ in any marked manner from the Dakota portrait. In both the pictures of the women, there is to be observed a similar variation between the female and the male of the same tribe, notably in the shape of the head, and the greater prominence, proportionally, of the cheek-bones in the women's faces.

It is premature to judge of the value of composite portraits. They are certainly curious and interesting, and many points will occur to the observer of these Indian faces. In a general way, they seem to confirm the results of a close study of the home-life and the various customs, including the most savage rites of war and religion, made by the writer among this family of Indian tribes, by showing them to be a people, intellectual rather than brutal, unawakened rather than degraded. The portraits indicate the stamp of tribal fixity, and reveal the unconsciousness within the individual of the analytical powers of mind by which man masters nature, — a peculiarity which is the key to much in Indian sociology and religion.

The writer is indebted to Mr. Jenness Richardson of Washington, D.C., for the making of the composites.

ALICE C. FLETCHER.

#### GEOGRAPHICAL NOTES.

**Siberian trade-routes.** — The practical failure of the route by sea has stimulated the search for routes of inland communication between Russia and Siberia. The latest investigations are those be-

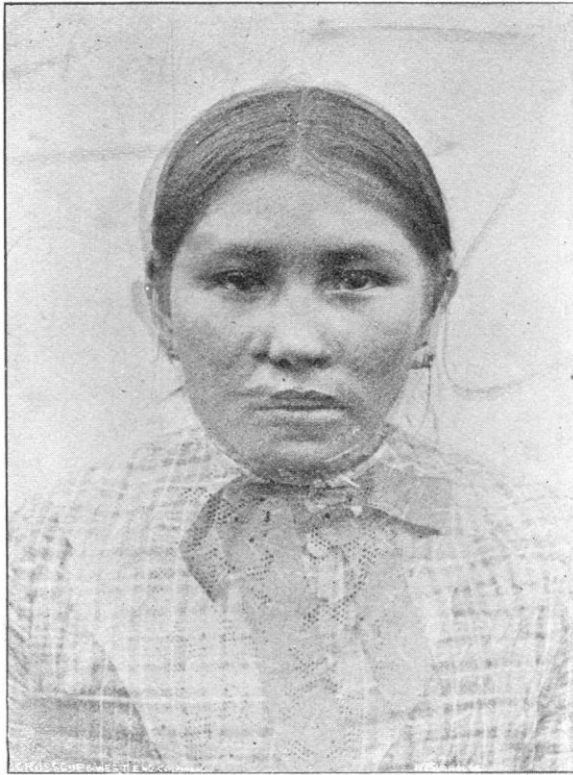


FIG. 1. — COMPOSITE FROM PHOTOGRAPHS.



FIG. 2 — COMPOSITE FROM DIRECT SITTINGS.



FIG. 3. — RULING FACE IN FIG. 1.

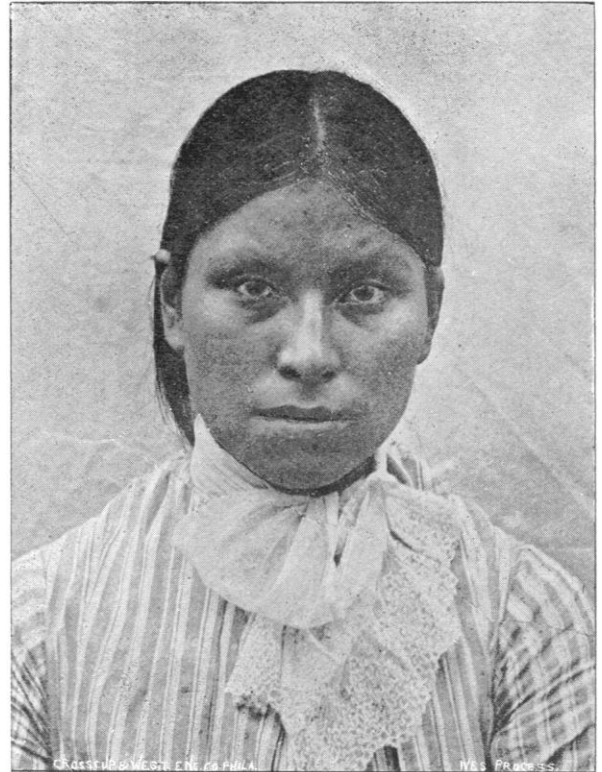


FIG. 4. — RULING FACE IN FIG. 2.

COMPOSITE PORTRAITS OF THREE DAKOTA WOMEN, SHOWING THE EFFECT OF THE METHOD OF PRODUCTION.

tween the Petchora and the Obi, under the auspices of Sibiriaoff and others, through the northern Urals. There are, it appears, several passes, the best probably that of Shokurinsk. This is ninety-eight miles long, and extends from Kurga on the Petchora, a town accessible by steamers, to the Sigva River, an affluent of the Sosva of the Obi basin. The pass is only 1,450 feet above the level of the sea, and 1,150 above the Sigva. A railway a hundred miles long will therefore connect these two great water systems, and avoid all the perils of arctic navigation in the Kara Sea and Gulf of Obi. Another pass, the Voikarski, is of about the same length, but rises two hundred feet higher.

**Partition of Patagonia.** — Patagonia has disappeared from political geography. The *Panama Star and herald* announces the result of the agreement, in regard to this region, by Chili and the Argentine Republic, who have absorbed it. To Chili has been assigned all the western slope of the Cordillera to the southern extreme of the continent, to the Strait of Magellan, and all the islands off that coast. The eastern slope of the range, and the vast pampas extending to the Atlantic, are now the property of the Argentine Confederation. The Strait of Magellan is declared neutral, and free to all nations. The chief island of Tierra del Fuego is parted equally between the two nations, Chili taking all the other islands, including that of Cape Horn.

**Miscellaneous.** — It is announced that news has been received from Ghardaia, in the Sahara, of the assassination of Lieutenant Palat the explorer. He was murdered by his Mohammedan guides two days after leaving Insalah. It is alleged that his death was due to the Senousian fraternity, the fanatical association, whose members were the assassins of Colonel Flatter's party in the same region, and are held responsible for the death of numerous other explorers. Baron Kaulbars, after nine years' labor, has finished a new chart of South America. It is published by Iliin of St. Petersburg, in eight sheets, and on a scale of 1 : 6,300,000. The author is now engaged on a chart of Africa, to have the same scale. It is said, that, after the fixing of the frontier line by the Russo-English commission, many of the Turkomans living on the fertile slopes of the Afghan mountains have moved to the Russian side of the line. As the country on this side is a desert, it is supposed that they cherish the idea that they will hereafter have an opportunity of raiding the Afghan settlements from Russian territory, — a course which would be likely, if not energetically repressed by Russia, to raise anew many international complications. Lieutenants Ryder and Bloch of the Danish navy will devote this summer

to hydrographic explorations in the district of Upernavik, Danish Greenland.

#### PARIS LETTER.

SINCE my last letter, a good deal of stir has been created in some circles by the death of three of the Russians sent to Pasteur, after having been bitten by a mad wolf. As is always the case, some persons cannot believe in methods that are liable to miss fire now and then : they think that medicine and physiology ought to be as precise and unvarying as mathematics ; they cannot understand that he who operates on living matter, operates on the most moving and varying of all grounds. No person of scientific training will wonder if Pasteur does not always meet with success : in fact, the experiment has only just begun, and we shall have to wait some time before a legitimate conclusion may be reached. I do not suppose that the fiery attacks of Rochefort, the renowned — and sadly renowned — pamphleteer, on Pasteur's experiments, are even able to attract the great experimenter's attention. They are good enough to amuse a few, but that is all.

However, as many newspapers have seemed rather dismayed by the death of the three Russians, and as some persons have seemed to be shaken in their confidence, M. Pasteur has deemed it advisable, at the meeting of the Academy of sciences, on the 12th of April, to give his opinion on the question. In his last paper, then, he begins by recapitulating the whole number of persons attended to by himself. At present this number is 688, of which more than half have outlived the more dangerous period, — that during which rabies is most likely to develop. Turning then to the question of the great danger of rabies communicated by wolves, he quotes many documents referring to the same, showing that recovery is very rarely met with. In Russia it is generally considered that persons bitten by rabid wolves have no chance of escaping their fate ; and it must be noticed, as M. Pasteur remarks, that in such cases the duration of the period of incubation is remarkably short. But the fatal effects of the wolf's bite is not due, according to Pasteur, to any increase of rabid virulence in the wolf. The virus is not, or at least does not seem to be, any stronger in the wolf than in the dog ; but as the wolf usually inflicts very severe bites, especially on the face and hands, the virus penetrates the body with much more ease. Such is, in Pasteur's opinion, the reason of the seriousness of rabies communicated by wolves. This opinion has led him to alter somewhat his method in cases where rabies is of wolfish origin : he is to tell us some day how he has altered it, and with what success.

Professor Vulpian, the eminent physiologist, has been recently elected *secrétaire perpétuel* to the Academy of sciences, in the place of Jamin. The election was a close contest. M. Henri Milne-Edwards was the other competitor, and the museum backed him solidly; but it was of no use: the son does not possess the influences the father exerted. It must be said also, that, from a general scientific point of view, Vulpian is far superior to his opponent as an original investigator and as a man of great culture. M. H. Milne-Edwards's works are rather few, while those of Vulpian are numerous and widely known. Among his principal contributions, we shall recall the following: 'Leçons sur la physiologie du système nerveux'; 'Leçons sur les vaso-moteurs'; 'Leçons sur les substances toxiques et médicamenteuses'; 'Leçons sur les maladies de la moelle.' Vulpian is a very kind-hearted and most excellent man. He is much loved by all the students, and is a man of high character. His whole life has been devoted to science, and, although a physician, he has never sought to extend his practice. It must be remembered, however, that he has been called upon to give his medical advice concerning two illustrious patients, — Count of Chambord, and Victor Hugo. It is generally believed that M. Brown-Sequard — well known in America — will be elected a member of the academy in Vulpian's seat, since it is the custom for the *secrétaires perpétuels* to resign from the section to which they were elected.

At the meeting in which Vulpian was elected secretary, M. Bouchard, professor in the medical school, read an interesting paper on the toxicity of urine during sleep and during waking hours. At the close of day this liquid is rather inoffensive; but, as sleep comes on, it grows more and more toxic: eight hours after waking, it is the most toxic possible. The symptoms of urine-poisoning are different with night and day urine. In the second case the symptoms are similar to those brought on by narcotics: in the first they resemble those provoked by convulsing poisons. Upon the whole, then, day urine tends to bring on sleep; and night, to awaken the sleeper. Professor Bouchard's paper is a very interesting one, and we have no doubt as to his obtaining very important results by continuing these experiments.

At the Académie de médecine, M. Marc Sée, at a recent meeting, read an interesting paper on the surface of the pulmonary vesicles. It is known, that, according to Küss, this surface is some two hundred square metres. M. Sée does not think that it is so great, but he still believes that it is equal to 130 or 135 square metres; that is, about ninety times the skin-surface. As it is, this surface is something enormous.

You may have heard some time ago of a very sad accident that happened in a mining-district near Périgueux, in the south of France. A sort of avalanche of rocks and earth buried a large number of workmen, and it was hoped for many days that they would be saved, because they might have taken refuge in caves in the hill when the avalanche occurred. In fact, it is certain that the unfortunate men were not — all, at least — killed by the accident. After every thing had been done to rescue them, and it was found impossible, owing to the immense quantity of materials to be bored through, a long hole was bored down directly to the caves, large enough to admit of the passing of provisions and tools. As nothing was heard, an effort was made to see what was going on within. An engineer and a photographer then devised a very ingenious plan. They sent down into the hole an electric lamp strong enough to illuminate the whole cave, and after that a photographic apparatus. The plate, after some time of exposure in the cave, came up, sure enough, perfectly impressed. But it revealed a ghastly scene. One of the bodies of the men — quite recognizable by the miners — was lying near the apparatus, and evidently had not long been dead. Near and around him pieces of other bodies were to be seen, and they were so disposed as to make it probable they had been torn from some corpse by the survivors. There is no reason, after the photographs, to suppose that these bodies were mangled by the accident, as they were quite *à l'abri* of the avalanche itself; at least, if they had been so mangled, these fragments could not have come naturally, or have been brought to the place where they were, unless by the survivors. This shocking tragedy has created a great excitement among the miners, who are convinced, that, if more haste had been made, some of the victims might have been saved. At all events, the idea of MM. Siemens and Langlois — the engineer and photographer — has proved a very ingenious one, and one that may be resorted to in similar cases.

The Gheel colony is certainly well known on the other side of the Atlantic. It is a colony for lunatics, where the no-restraint system is the only one used. The insane, instead of being shut up in cells or asylums, are committed to the care of the inhabitants of the country with whom they live, as would sane persons, for a very modest payment. This system is a very old one, and Gheel is unique in the world; the inhabitants being trained to keeping the insane, and living with them, for many centuries. However old, the system seems to be very good, at least for a large proportion of insane who do not require to be shut up, and to whom life in the open air seems to be



very beneficial. The Belgian government has decided to try and create a second Gheel, and has chosen Lierneux, wishing to have a Gheel where French is spoken, for the benefit of the part of Belgium where French is the only language understood, as Gheel is in the Walloon part of that country, and is very inconvenient for French-speaking insane. This plan seems to meet with success, and Lierneux is already provided with a number of patients, and with a committee for inspection and surveillance. We hope that Lierneux will thrive as well as Gheel has and does. I visited Gheel two years ago, and convinced myself that the insane are under happier and in healthier conditions than in asylums, and that if they are well looked after by the authorities, they are as well nursed and cared for. I may add, that, when a system has outlived some centuries, there must be some good in it.

A Parisian physician, Dr. Sandras, created some time ago quite a sensation in the medical world by a paper on the possibility of modifying the human voice to an unprecedented extent by the use of different inhalations, bringing to the larynx air saturated with different vapors. His opinion is based exclusively on experimental tests, not at all on theoretical views. Dr. Sandras pretends to be able to change the nature, intensity, pitch, and extent of the voice in quite a surprising manner. For instance, after ten or twelve inspirations of alcoholic vapors, the voice becomes quite hoarse, and cannot give more than five or six different notes. Inhalations with Guyot's *eau de Goudron* enfeeble the voice; on the contrary, *eau de Botot* strengthens the voice in a very marked manner; and with some essences—Dr. Sandras does not say which—this strengthening is so very great that the voice acquires new notes, high as well as low. Other substances confer only low notes; and others, only high ones. If the facts discovered by Dr. Sandras prove to be true for other persons than himself, this discovery will be very useful to singers, preachers, lawyers, and all persons generally that are obliged to use their voice a great deal. If it is also true that hoarseness of the voice brought on by cold can be cured in a few minutes, I do not doubt that the method will be much appealed to. For singers, certainly, the possibility of increasing the number of notes of the voice, either in the upper or in the lower or in both keys, will be much appreciated. Experiments with Dr. Sandras's method are to be made in the Conservatoire de musique.

The second number of the *Archives slaves de biologie* contains many interesting papers. One of them is by Professor Anrep, on ptomaines. The author has witnessed many cases of poisoning by

preserved fish (sturgeon) in Russia, and has been able to isolate and extract the poisonous substance by the Stass-Otto method. The ptomaines so obtained are very toxic; and the symptoms brought on in animals very much resemble those of the principal depressing and paralyzing poisons.

Prof. A. Gautier has recently published an account of his experiments and researches on ptomaines and leucomaines. The facts he has discovered are very interesting indeed, and he has opened new ways in chemistry and physiology. The first leucomaine discovered was creatinin, found by Liebig and Petenkofer in 1849. Since then, M. Gautier, in 1881, following researches begun by his pupil, G. Pouchet, and beginning new experiments of an entirely different order, has been able to isolate many leucomaines very analogous to ptomaines, but quite different in that they develop only in living organisms. Leucomaines are found abundantly in the muscles: they are of many sorts. Xantocréatinine, crucocréatinine, amphicréatine, pseudoxanthine, are the most important. As to the manner in which these leucomaines originate, Professor Gautier cannot say, but he believes that the oxygen brought into the organism is the most efficient agent in the destruction of these poisons. They all oxidize very easily. Of course, if, for some reason or other, oxygen is less abundant in the blood (anaemia, chlorosis, etc.), leucomaines may become very abundant, and exert a toxical influence on the organism. Professor Gautier's experiments are very interesting from a physiological point of view: they may also become a standpoint for very useful pathological applications, because it is very natural to suppose, that, if leucomaines are able to originate and accumulate in a certain quantity in the organism, they must surely, in some cases, represent the origin of sundry diseases, or at least certain symptoms, hitherto unexplained or misinterpreted.

Yesterday evening, the Stanley club, which comprises the leading members of the Anglo-American colony in Paris, gave a dinner at the Continental hotel in honor of Pasteur. M. MacLane presided, and at the end of the dinner proposed a very appropriate toast to Pasteur, concluding as follows: "The United States, represented by the Stanley club, give you greeting, sir, as one of the most illustrious of those *esprits d'élite*, and, while proposing your health, I express, on America's behalf, the hope that your career, already filled up with so many great works, shall be yet a durable one, for the joy of those who suffer, and for the instruction of those who learn by your example how disease may be overpowered by labor and science." M. Pasteur answered M. MacLane, giv-



ing interesting details of his work, and also of his own character and temper. The passage is worth while quoting: "There are two men in me,—the one, timid, self-defiant, and of *humeur facile*, who accepts thankfully good advices and discussion; the other is a great deal less easy to manage. When, after having thoroughly used all the resources of experimental science, I am quite sure of having attained to truth, a second man arises in myself, absolute, very harsh in discussion, and of *humeur farouche*. . . . I am no more in November, 1885, timid, troubled, sleepless, always haunted by the nightmare of rabies. We are in April, 1886. Having called to aid all the resources of experimental science, I am now in possession of the exact scientific truth concerning this question." M. Pasteur concluded in proposing the joint health of America and France, "two nations formerly sisters on the battle-ground." Toasts were next proposed by M. de Blowitz and de Lesseps, and the meeting broke up after mutual expressions of sympathy and good feeling had been freely exchanged.

H. V.

Paris, April 15.

#### NOTES AND NEWS.

A STRANGE nuisance of rats has developed itself in some parts of New York City, reaching such an extent as to call for an examination of the circumstances by the proper city authorities, and making dwellings almost uninhabitable. These animals are known to possess a remarkable migratory instinct, congregating in large numbers, and overrunning whole regions, to afterward as suddenly and strangely disappear. Dr. Buckland relates instances of their migration from house to house at certain times of the year, influenced probably by the lack or abundance of food. In a certain part of Berkshire, England, there were situated a number of isolated barns on the bleak, barren downs; and the rats were frequently met in colonies at early morning, marching in long lines direct from one barn to another. They were watched, and seen to go directly across the country in a straight line; and the most curious part about the circumstances was the instinct that told them where to go, or to find those barns which contained grain. At Central park there is no unusual number, though they find in spring plenty of food along the lakes in the grain fed to the swans and other aquatic birds. This grain is placed in boxes at some little distance from the water's margin, but the rats are not thus hindered from purloining it: they swim to the boxes, extract the grain, and then swim with it back to the shores. In the winter they collect about the animal houses. In

the Philadelphia zoölogical gardens they have been very numerous, and not a little of a nuisance.

— Mr. Charles Rhodes of Oswego, N.Y., has lately published a circular giving the monthly and annual levels of Lake Ontario at Oswego for a number of years, as determined by records of the army engineers. The variations of level seem to be irregular, and are not well explained. For example, in April, 1873, after eighteen months of low water, the lake rose about two feet and a half in twenty days. When it is considered that the whole inflow of the Niagara during that time would scarcely more than produce the rise, even if the escape by the St. Lawrence were stopped meanwhile, the magnitude of the change may be appreciated, but can hardly be well accounted for. Mr. Rhodes also gives account, in a personal letter, of oscillations in the water of the lake that seem to correspond to the *seiches* of Lake Geneva and other Swiss lakes. He describes sudden flows of the water from Lake Ontario into the Oswego River, with a rise of ten to eighteen inches, followed, in half an hour or so, by an equally sudden discharge and fall, going as much below the ordinary level as the rise had been above it. Smaller oscillations succeed, gradually fading away. All such large and sudden fluctuations are followed by storms of wind, rain, or both. These singular phenomena, so well studied out by Forel in Switzerland, have received but little attention in this country. The records of lake-levels kept by the army engineers would probably afford many examples that should receive investigation.

— At one of the recent sessions of the Prussian Landtag, it was stated that the rigorous laws adopted in 1880, relating to rabid animals, had produced most excellent results. These laws impress the necessity of veterinary examination of all animals suspected of rabies, and if, in any case, the presence of the disease is determined, require that all animals which have been exposed to danger shall be immediately killed. Furthermore, in any district where a rabid cat or dog is seen, it is ordered that all dogs shall be confined or muzzled. As a result of these laws, there has been a steady decrease in the number of mad dogs. In 1880–81, 672 rabid dogs were killed; in 1881–82, 532; in 1882–83, 431; in 1883–84, 350; in 1884–85, 352. During the first of these years (1881–82) 2,400 other dogs, which had been exposed to the danger of contagion, were killed; in 1884–85 the number was 1,400. The number of human deaths has decreased in the same ratio: thus in 1880–81 there were ten; in 1881–82, six; in 1882–83, four; in 1883–84, one; and in 1884–85, none.

—The Smithsonian institution received last week a foetal pygmy sperm-whale (*Kogia breviceps*) from Mr. George Sayers, keeper of the Sea Island city life-saving station, New Jersey. It has been discovered that this species of *Kogia* breeds at this time of the year. Last May a specimen was also sent to the institution. Early this winter a female of this species was received, containing the smallest foetus of this cetacean ever found, not more than six weeks old.

—The naturalists of the fish commission steamer Albatross, which is now engaged in taking soundings among the Bahamas for the hydrographic bureau of the navy department, have recently sent home a part of their collections in this locality. Besides several new species of birds, the collection contains a number of specimens of Kirtland's warbler, which, ornithologists will remember, is a very rare species to our fauna. Very few specimens have ever been taken within the limits of the United States, and it is not until recently that its habitat has been discovered; in this locality, however, it is found in abundance. The Albatross will return from her work in the Bahamas on or about the 12th of this month.

—The off-shore seal-fishery of Newfoundland this year has not proved a success. The largest fare taken was about 34,000 seals; the average, less than 12,000; the total, about 163,300, divided among fourteen vessels. The fine steamer *Resolute* was driven by the ice upon a reef north-east of Fogo, and is a total loss. Once in every ten or fifteen years it happens, that, owing to the prevalence of easterly winds, about the time for taking the young seal, the ice on which they are is driven landward, and forced, a compact mass, into the northern bays, where vessels cannot follow. The residents along the shore then reap a harvest as long as the wind is favorable and the ice clings to the land. It is estimated that from 100,000 to 150,000 seal have been taken in this way this season, which is a godsend to the people, who are mostly very destitute. In some places the land-catch has averaged thirty per man, each worth about two dollars, of which the captor owns the whole; while on the steamers the owners of the vessels receive one-third of the catch.

—In a communication before the French academy of sciences on April 12, M. Pasteur stated, that, of the 726 persons treated for hydrophobia by him up to that date, 688 were bitten by mad dogs, and 38 by mad wolves: among the former there had been one, among the latter three deaths. From a collection of cases in man from the bites of mad wolves, he finds the percentage of mortality as high as 82, and the duration of

incubation much shorter: he therefore concludes that there is greater virulence in the poison from this source. Instead of three deaths so far, among those bitten by the mad wolves, he believes that there should have been fifteen or sixteen, had his treatment been ineffectual.

—A lively discussion on the subject of the poisonous mussels of Wilhelmshaven (*Science*, vii. 175) yet continues in the German medical periodicals. From the conclusions already reached, it appears evident that simple stagnation of seawater is capable of giving rise to poisonous qualities in the animals inhabiting it; and that, too, when the water may be uncontaminated by sewage or other impurities. Poisonous qualities precisely similar to those of the mussels have been observed in the star-fishes of Wilhelmshaven. The poison in the mussels has been isolated, and described as a ptomaine under the name of mytilotoxin; but Professor Virchow says it cannot be a true ptomaine, as it is not a product of decomposition. A large share of attention has been given, by the various writers on the subject, to the question whether these mussels are of a new and introduced form or not. It is generally agreed that they are not, yet there seems to be tolerably constant differences from the true *Mytilus edulis*, probably due to the conditions in which they grow. Professor Virchow adds a point of practical importance; viz., that the experienced fishermen of Christiania warn consumers against the use for food of mussels and oysters which have been attached to ships' bottoms, old wood-work, etc.

—The new microscope objectives, of which notice was given in *Science*, are more fully described in the last number of the Journal of the Royal microscopic society. They are receiving high praise, — 'the microscope of the future,' as Professor Abbe calls them, — and it is believed that high-power work hereafter will almost necessarily be done with them. The two  $\frac{1}{4}$  objectives which have been received in England are composed each of ten single lenses, combined to form five separate lenses, with a single front lens; but the special point in their construction is that they are made of the new kind of optical glass which Professor Abbe and Dr. Schott have been working for the past five years to perfect. Of the ten lenses, two only are of siliceous glass, the other eight being made of borates and phosphates. The crown and flint glass ordinarily used by opticians does not contain more than six chemical elements, while the new glass contains no less than fourteen. This glass was discovered nearly three years ago, and objectives were then made

by Zeiss; but, as it was decided to establish a manufactory for the production of the glass with the aid of the money — \$15,000 — voted by the Prussian government, Messrs. Zeiss were obliged to abstain from using it until it should be accessible to other opticians also. In a few months it is expected that the preparation for the supply of the borates and phosphates, as well as the siliceous glass, will be perfected, when both objectives and glass will be obtainable in the usual way. Mr. Nelson, who has examined one of the objectives, writes thus: "The great benefit which will accrue to microscopists from the use of lenses of this construction will be due, not so much to the absence of color, as to the greater freedom from spherical aberration. . . . It is decidedly the most brilliant objective I have ever seen."

— The department of physical education in Amherst college has lately included among its statistics those relating to the condition of each student's eyes upon entering college. The summary of the results obtained from the examination of the classes of 1888 and 1889, comprising 199 men, shows a larger percentage of impaired visual organs than might be expected. In the following table the percentages are given for the two classes combined.

|                                                     |      |
|-----------------------------------------------------|------|
| Perfect vision, in both eyes, 14.0; in one eye..... | 13.0 |
| Far-sighted, " " 36.5; " " .....                    | 8.0  |
| Near-sighted, " " 15.5; " " .....                   | 8.0  |
| Astigmatic, " " 15.0; " " .....                     | 7.0  |
| Other defects.....                                  | 1.0  |
| With good color-sense.....                          | 93.5 |
| With feeble color-sense.....                        | 3.5  |
| Partially color-blind.....                          | 1.0  |
| Completely color-blind .....                        | 1.5  |
| With blue eyes.....                                 | 54.0 |
| With brown eyes.....                                | 32.0 |
| With gray eyes.....                                 | 13.5 |

The percentage of those with perfect vision in one or both eyes was nearly the same in both classes; but a considerable variation was observed in the number of the far-sighted, near-sighted, and those with imperfect foci (astigmatic).

— Mr. Scudder's 'Systematische übersicht der fossilen myriopoden, arachnoideen und insekten,' from Zittel's 'Handbuch der palaeontologie,' is a valuable *résumé* of our present knowledge of fossil insects, and one which fills a long-felt want. It is richly illustrated with excellent figures of the principal forms, and contains a concise and careful summary of the extinct genera. Entomologists, to whom the work should have its greatest value, will be glad to learn that it will shortly be published in English.

— The additions to the literature of bacteriology during late years have become so extensive and numerous that even the specialist can hardly keep

pace with the publications constantly appearing. For this reason the new "Jahresbericht über die fortschritte in der lehre von den pathogenen micro-organismen" (Braunschweig, *Bruhn*, 1886), by Professor Baumgarten, will be welcomed by all those interested in this broad field. The first volume, for 1885, is a work of one hundred and ninety-two pages, comprising bibliographical lists of the separate papers and volumes that appeared during the past year, with abstracts of their contents, under the titles, 'Text-books and compendiums,' 'Parasitic micro-organisms (including micrococci, bacilli, actinomyces, and pathogenic spirillae, hyphomycetae, and protozoa),' 'Saprophytic micro-organisms,' and 'General technique.' The work cannot help but be very useful to both biologist and physician.

— The Société philomathique of Bordeaux has organized an international congress on technical instruction, which will be opened on Sept. 20 next, at Bordeaux.

— The falling-off in the average size of families in France, as shown by recent statistics, has induced the enactment of a decree re-affirming the law whereby every father of a family having seven living children may have one of his sons educated at the expense of the state.

— The Spanish Royal academy of sciences has offered premiums for papers on bird migrations and habits, as observed in the littoral and central regions of the peninsula. The particular subjects to which attention is directed, as given in *Cronica cientifica*, are very similar to those proposed by the bird-migration committee of the American ornithologists' union.

— Dr. E. Reyer of Vienna, who made a geological tour through this country two years ago, has lately published two profiles through the Sierra Nevada in a supplement to the *Neues jahrbuch für mineralogie*. He finds the evidence of faulting, down to recent dates, very distinct on the eastern slope of the range, even glacial striae being displaced at many points, and the downthrow nearly always being on the eastern side of the fracture. The eruptive masses, by which the sedimentary strata of the range are much disturbed, are generally regarded as younger than the sediments. Dr. Reyer modifies this view by supposing them to be older than the oldest strata which lie conformably upon them, although greatly disarranged from their original attitude by massive eruption-like overturnings. In the down-faulting origin of the Yosemite valley, and in many other points, he confirms the views of Professor Whitney.

—The summer course in entomology and general invertebrate zoölogy, of Cornell university, will begin Monday, June 21, next, and continue ten weeks. After completing an elementary course in either general zoölogy or entomology, the student may select some subject in systematic zoölogy, economic entomology, or insect anatomy, for special investigation. It is planned to have the work of each student, as far as possible, an original investigation. Members of this class will have free use of the library, and all other privileges of students of the university. Those desiring to join the class should make application to Prof. J. H. Comstock, Ithaca, N.Y., before June 10.

—From the returns of the German quinquennial census, in December last, it was found that Prussia has a population of 27,279,111, an increase of 3.79 per cent; Bavaria, 5,284,778, an increase of 2.49 per cent; Saxony, 2,972,805, an increase of 6.94 per cent, the largest of any of the states, the returns of which are so far available. In only a few provinces has there been a decrease; Pomerania, with 2.22, being the most important.

—The cold weather during the past winter in Florida, has, Dr. Riley finds, destroyed the injurious orange scale insects wherever it was severe enough to cause the shedding of the leaves. The eggs, however, were uninjured.

—The journal of the Society for psychical research for April contains a second instalment of Mr. Myers's 'Notes on the unconscious self,' which is principally devoted to answering the criticisms of Hon. Roden Noel on Mr. Myers's previous papers. Some interesting anecdotes on the general subject of mesmerism are given by C. Kegan Paul, the well-known publisher, and his sister. At a general meeting of the society, announced for the evening of May 3, Mrs. Henry Sidgwick was to read a paper on spiritualism, which was looked forward to with great interest.

—In tables just published by the U. S. geological survey, Mr. J. D. Weeks gives the total production of manganese ores in the United States during 1885 at 23,258 tons, with over seven thousand additional tons of manganiferous iron and argentiferous manganese ores. For the year 1884 there were 10,180, for 1882 only 4,532 tons. This includes only those ores containing over 44 per cent of metallic manganese.

—The small island Juan Fernandez, where Alexander Selkirk passed his four years of solitude, has been leased by the Chilean government to a Swiss named Rodt, who has established there

a flourishing colony. M. Rodt exercises the powers of a viceroy, and has the fullest administrative authority. The chief occupation of the inhabitants is agriculture, but some branches of manufacturing industry are also practised. M. Rodt encourages immigration, and among the new Crusoes are to be found Austrians, Englishmen, Frenchmen, North and South Americans, South Germans, Swiss, and Spaniards. There are no Prussians, the governor having a rooted antipathy to Prussia.

—The tenth anniversary of Johns Hopkins university was celebrated April 26. The statistics show that the whole number of students admitted since its foundation is 923, of whom 19 have died. Addresses were made by Profs. W. H. Welch, and H. A. Rowland, and others.

—The Smithsonian has received the first evidence of the successful introduction of salmon in the head waters of the Potomac. Last week Mr. R. A. Golden, a fish-dealer in the Washington market, presented a fine specimen of the Sebago salmon to the institution, measuring over one foot in length. It was caught in a trap-net at Ragety Point; and the presence of this well-grown specimen in the Potomac waters is an earnest of what may be looked for in the future. The introduction of land-locked salmon in this river marks an important era in the progress of fish-culture and the success of the U. S. fish commission.

—The proposition to establish a national military and naval museum in Washington appears to be regarded with general favor. The plan proposed is to erect a building on the Smithsonian grounds for this purpose, the museum to be under the supervision of the Smithsonian. This plan would doubtless commend itself to congress more forcibly than would the proposition to erect a large separate building in another part of the city. The army and navy museum would be quite distinct from the other departments of the national museum, and would be placed under the control of representatives of the two services upon which it must depend for growth and development.

—The vessels belonging to the U. S. coast survey were assigned to duty last week. The *Palinurus*, Lieut. D. D. V. Stuart commanding, is stationed in Long Island Sound; the *Eagre*, Lieut. C. P. Perkins, in company with the *Daisy*, will proceed in a few days to the North River, to complete the work begun last year by the *Palinurus*. This work will take until the middle of July, when the *Daisy* will be employed along the shores of Staten Island. The *Eagre* will then begin operations in the East River at a point midway

between Hell Gate and Blackwell's Island, working by degrees through the sound until meeting with the *Palinurus* coming west.

— Some estimate of the signal service as a promoter of original research may be gathered from the fact that two of the three gold medals awarded by the Royal geographical society were secured by Lieutenant Greely and Sergeant Brainard, for geographical discoveries. Professor Langley was awarded the Draper medal by the National academy, for discoveries at Mount Whitney; and the Royal society of science, letters, and arts, has made Lieutenant Finley a member with its highest honors, for his original work on the subject of tornadoes, all of which was under the direction of the signal service in its legitimate duties.

— The secretary of state has forwarded to the house of representatives a letter from the American minister at Paris, enclosing an invitation to the United States to be represented at the convention of the Philomathical society of Bordeaux, France, to be held Sept. 1. The purpose of the convention is to consider all questions relating to commercial and industrial education. A letter from commissioner of labor, Wright, suggests the following gentlemen as delegates: Prof. C. M. Woodward of the St. Louis manual training school, Prof. W. P. Atkinson of the Massachusetts institute of technology, and professors from the Columbia school of mines and Stevens institute.

— Alfred Rabaud, founder and president of the Geographical society of Marseilles, died on April 12, aged fifty-eight.

— Reymond communicates some interesting notes as to the geology of the region of the great African lakes, especially of the south-east part of the Tanganyika and Nyassa basins, from specimens collected by Giraud. The region appears almost exclusively composed of primitive rocks. The only sedimentary rocks collected were from south of Tanganyika, at Yendivé station, and from Mpsa, two or three days' march from the northern end of Lake Nyassa to the north-west, on the route between the two lakes. These rocks are of a schistose character, contain *Cyrena* and remains of *Lepidosteus*, and are referred by Reymond to the upper cretaceous or lowest tertiary age. This agrees with what is known of the geology of Africa in general, where the cenomanian and nummulitic strata alone are found resting on a vast denuded plateau. The beds of brown iron ore, which cover a very large extent of country, and are worked by the natives, are supposed to have been leached out, as it were, from the crystalline rocks, by the action of the water and car-

bonic acid held in the vast bogs and spongy marshes of the region. One of the chief characteristics of central Africa is the absence of calcareous formations. The metallic wealth of the country, except for iron, is little known; but Giraud reports copper rather abundant between Bangweols and Luapula. In South Africa the sedimentary beds are of greater extent, and contain a considerable amount of coal of inferior quality. The collection of fresh-water and land shells made by Giraud comprises, according to Bourguignat, ninety-three species and several new forms.

— What appears to be a justifiable complaint against the delay in printing scientific reports is made by Commissioner Colman to the senators and representatives. Of the forty-five thousand copies of the first annual report of the bureau of animal industry, ordered nearly two years ago, scarcely a twentieth part have been so far delivered by the printer. Another work, Riley's report on the cotton and boll worm, long since ordered, and in the printer's hands, has not yet been delivered, though stereotyped for nearly a year.

— In a recent letter to Professor Riley, U. S. entomologist, Mr. J. Birkbeck Nevins of Liverpool gives an analysis of dried locusts from observations made by Edward Davis, president of the Liverpool literary and philosophical society, as follows:—

|                                   | Without wings. | Wings developed. |
|-----------------------------------|----------------|------------------|
| Phosphoric acid ( $P_2O_5$ )..... | 1.92%          | 1.89%            |
| Tribasic phosphate of lime.....   | 4.21%          | 4.13%            |
| Nitrogen.....                     | 10.14%         | 10.64%           |
| Ammonia.....                      | 12.31%         | 12.92%           |

This shows that these dried locusts are as rich in nitrogen as meat, guano, or dry blood, and contain enough phosphoric acid to greatly increase their value as a manure which English authorities estimate at about twenty-five dollars per ton.

#### LETTERS TO THE EDITOR.

*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

#### Science at Cornell.

WILL you allow space to one who has known Cornell from the beginning, who has watched her progress with the greatest interest, and who knew personally Mr. Cornell and President White, for a few comments upon recent letters in *Science* in regard to 'Science at Cornell'?

It seems to the writer that almost every one connected with Cornell misconstrues the fundamental law. President Adams says, "It includes not simply agriculture and the mechanic arts, but," etc. President White speaks of the efforts of the trustees being "devoted to agriculture and the mechanic arts alone." When, some years ago, a committee of the legislature was appointed to investigate Cornell, and report as to the way in which the provisions of the law and the charter were being carried out, that committee was shown the machine-shops and farm, and the work of the professor of agriculture and of the professor of mechanic arts, as though these departments comprised the whole of the provision made at Cornell for fulfilling the requirements of the law. The law says, to teach *such branches of learning as relate to agriculture and the mechanic arts*. Does that mean that boys shall be taught to hoe corn, or plant potatoes, or shove a jack-plane, or swing a hammer? What are those 'branches of learning that relate to agriculture'?

Mathematics, the physical and natural sciences, drawing, mechanics, and the characteristic studies of mechanical and civil engineering, — all these 'relate to' agriculture, or the mechanic arts, or both. The law requires that the *leading object* of the institution founded under it shall be to give instruction in such branches. Will this be the 'leading object' if, as suggested by President Adams, only six hundred thousand dollars of the endowment should be devoted to this purpose? To the writer nothing can be plainer than that, to fulfil the law, whatever other endowment is accepted, whatever other branches are taught, the institutions founded upon the land-grant must make "such branches of learning as relate to agriculture and mechanic arts" (not agriculture and mechanic arts themselves) the *leading object* of instruction.

President Adams says the instruction contemplated by the law includes not simply agriculture and the mechanic arts, but other scientific and classical studies, military tactics, and the several pursuits and professions of life. This last is made to appear by quoting the last paragraph of the much-quoted passage first.

The meaning of that whole passage seems so plain, that it is strange that such diverse interpretations should be put upon it. It requires the founding of an institution whose branches of learning relating to agriculture and the mechanic arts shall be the leading object of instruction, and where other sciences and the classics may have a place, in order that the industrial classes in the several pursuits and professions of life may there receive a 'liberal and practical education.'

Can any thing be plainer than that the institution contemplated by the land-grant act should have for its leading object, whatever else it does, to provide for the instruction of the industrial class in such branches of learning as they most need in their pursuits?

Now, have the branches of learning that relate to agriculture and the mechanic arts been so well provided for that it is time to reduce expenditures in those directions for the purpose of establishing law and medical schools and what not? Large additions have been made to the material equipment of some of the departments; but not one of them can be considered fully equipped, and some have suffered in usefulness the last year from the cutting-off of ap-

propriations. Some important branches are suffering for want of instructing-force. This is notably the case in chemistry and physics, where the number of instructors is less than for the same branches at some of the classical colleges, and much less than at some of the technical schools.

The proposition to multiply departments at Cornell seems to the writer most unwise. It is far better to take the highest rank in a few departments, if those are in the direction of the object contemplated in the foundation, than to take a lower rank in a wider field; and it is certain that the income of Cornell will need to be much larger than at present before she can take first rank in all the departments now established.

A. W.

### Phylloxera.

The following answers were suggested by the questions relating to the phylloxera, asked by 'A. M. D.' in the issue of *Science* for April 2, 1886.

1. Was it known as a pest in this country before its introduction abroad? The gall-type of the phylloxera was first known and described by the state entomologist of New York in 1856, seven years before the same form was known in any European country. Unmistakable evidences of its existence reach much farther back, even to 1843. In later years more or less injury was done, but the true cause of the trouble was not known until the discovery of the root-type in 1868.

2. When and how did it reach Europe? The effect of the pest was first noticed in France, by M. Pinarum, in 1863; the gall-type was described by Westwood, in England, in the same year; and the first statement of the disease in Germany followed two years later; but it remained for Prof. J. E. Plouchon to first announce, in 1868, the discovery of the root-type, and to give to it the name it now bears. During the same year the winged form was discovered, and the following year the root-type was asserted to be of the same species as the gall-type of the United States. The vineyards were noticeably diseased some time before, particularly those near some American vines which were a part of a heavy importation made in 1860, — the probable time of the introduction of the pest. Undoubtedly the pest reached France through these cuttings or stocks. The fact of transporting by cuttings is further evidenced by later experience in Germany, Switzerland, and other countries where infection began among American stocks.

3. Why is it more injurious in Europe than in its native habitat? Four reasons may be given: 1. Insects indigenous to a country are frequently kept in subjection by its enemies. Such is the case to a great extent in the Mississippi valley, where the galls of the phylloxera are often cleared of its inhabitants by depredating enemies. This restriction is removed in the new country, and the pest has full chance for development. 2. The predominating varieties of vines of Europe, and also of California, are of the kind most attractive to the root louse, while Mississippi valley produces largely gall-bearing varieties of vines, which to a greater or less extent resist the attacks of the root-louse. 3. The predominance in Europe of the most destructive type, the root-louse, against the gall-louse in the Mississippi valley, — the one attacking the roots, and affecting the vine permanently; the other attacking the foliage, and pro-

ducing only a transient effect. 4. Probably the chief cause of a comparative greater destruction can be found in the difference in soil, and more especially in the climate; that is, when European countries are compared with districts, like California, cultivating a similar variety of vine. It has been a notable feature in California experience that the spread is usually very slow, and only showing noticeable rapidity in exceptional cases. In our observations (see 'Report of college of agriculture, 1886') we have shown that a peculiar growth of roots, induced by late rains, or again by surface manuring, will produce the winged form in great abundance. But the general climate of California is extremely dry during this growing period, and therefore no such roots are apt to be formed; while in the portions of Europe where the spread has been most rapid, their type of vine being similar to that of our own, a growth of fine surface rootlets is undoubtedly induced by the summer rains, and myriads of the winged-form insects developed and spread to adjoining vineyards. The effect of fertilizing on the production of similar rootlets is doubtless greater than is usually supposed.

4. Is there any reason to suppose that the pest will be mitigated by natural causes as time goes on? As yet there seems to be no evidence in favor of such a supposition. This case should be analogous to that of other insect pests, which have been overcome only by insect enemies. This insect has been with us many years; and yet no enemy which can destroy all the forms has appeared, although the gall-type, accessible above ground, has undoubtedly been decreased in numbers by such enemies as the thrips, tyroglyphus, and others. No enemy with the needed multiplicity of forms, enabling it to traverse the vine and at the same time all parts of the roots, is known. Until such does appear, there is little doubt that the loss caused by any local disturbance will soon be replaced by the other types, and thus the species will be continued. F. W. MORSE.

Berkeley, Cal., April 22.

### Topographical models or relief-maps.

I hope you will find space in your paper for the following description of a new method of making topographical models from contour maps. I completed it a few weeks ago, and have made several models of complicated surfaces.

Make a careful tracing of the contour lines on waxed or oiled tracing-paper. Linen must not be used, as it will distort the lines when wetted. Paste the tracing on a clear piece of white holly veneer an eighth of an inch in thickness, and cut or have cut, with a fine fret-saw, the lines of contour, leaving spaces now and then, should the lines so run that the intervening wood would drop out. Fasten the veneer to a board, being sure that the surface is flat. Fasten veneer by the edges, and not through the spaces between contour lines. Cut or have cut strips of thin brass, each strip being as wide as the height of each contour line, and insert the strip into the corresponding saw-cut in the veneer. They must be pressed down until they touch the board below the veneer. When all the contours are in place, paint the whole surface over with heated wax, which will prevent the moisture of the clay from distorting the wood. When all is coated, fill in the spaces between the strips with clay until only the edges of the brass

show. Where spaces are left, the strips are cut with a slanting end long enough to span the space uncut, and the line of contour is thus unbroken.

By this method nothing is left to the eye, and perfect accuracy is gained. I have made some models for Prof. N. S. Shaler, and it was at his request that I send this description to your paper.

HENRY BROOKS.

Boston, April 26.

### Poison rings.

Appreciating your kindness in inserting my previous letter, containing a number of questions as to what we know of the past of the pest phylloxera, and what we may expect for its future, answers to which would certainly interest many laymen like myself, and not discouraged by the lack of response from your readers, I venture to send you this.

In the recently published volume (xx.) of the 'Encyclopaedia Britannica,' under the head of 'Ring,' it is stated that "Pliny records, that, after Crassus had stolen the gold treasure from under the throne of Capitoline Jupiter, the guardian of the shrine, to escape torture, broke the gem of his ring in his mouth, and died immediately." Hannibal is also recorded as having killed himself with his ring; and the writer further says, the "*anello della morte*, supposed to be a Venetian invention, was actually used as an easy method of murder."

Can any of your readers inform me whether any of these ancient rings are still in existence, and, if they are, how they are made, and with what poison they were filled? A. M. D.

New York, May 3.

[We publish this week a reply to 'A. M. D.'s' queries about phylloxera; and, doubtless, information as to 'poison rings' will be forthcoming. — Ed.]

### A swindler abroad again.

It has just come to my knowledge that the 'tramp' geologist who has been 'wandering up and down the earth' for the last three years, the man of many accomplishments and aliases, is now in the vicinity of St. Cloud, Minn., posing as 'Capt.' I. C. White of the West Virginia university.

I would say, in my own defence, that the title of 'captain' is not worn by me, and that in this case I can establish an *alibi*, with the help of my friends.

Cannot something be done to throttle this nuisance before he scandalizes every geologist in the country? Probably a committee from those whom he has swindled and misrepresented would hunt him down most successfully, and I am sure such a committee could be trusted to squelch him effectually.

I. C. WHITE.

West Virginia university, April 29.

### Pompous prolixity of the French.

One reads with amused surprise, on p. 403 of the last issue of *Science*, that the literary style of French scientific writers is characterized by 'pompous prolixity.' We all understand that "that which is not clear is not good French." We had supposed that the genius of that sententious language was as much opposed to pomposity and prolixity as to obscurity.

A. G.



# SCIENCE.—SUPPLEMENT.

FRIDAY, MAY 7, 1886.

## IS THE OCEAN SURFACE DEPRESSED ?

### I.

THE *Revue scientifique* published recently the following discussion on the communication made in January at the Sorbonne by H. Faye, upon the permanence of the earth's figure throughout geologic times. The eminent academician then affirmed that accord exists among geodesists as to the figure of our planet; that the measures of arcs of meridians already made have done away with all irregularities, which at the beginning of this century were supposed to exist; and that one can assign for the form of the surface of the sea an ellipsoid of revolution, having an eccentricity of 1:292 (accurate to one unit in the denominator).

I do not feel able to say how the assertions of M. Faye can be reconciled with the diametrically opposite ideas which have been developed in recent German works, noticeably in the 'Lehrbuch der geophysik' of Günther, the works published in 1868 by P. H. Fischer, in 1873 and 1877 by Listing, and, above all, in the important memoir which Bruns published at Berlin in 1876; which last is not even mentioned by the learned French astronomer. I can only call attention to his estimation of their value, without being able to judge of the reasons which have determined it. I must leave this to the geodesists.

I would say the same thing of another assertion of M. Faye,—that relative to the constancy of the force of gravitation at the surface of the sea along the same parallel. "Navigators," says he, "have carried the pendulum at the surface of the sea over a large portion of the earth, and in both hemispheres, without the pendulum indicating the least diminution of the force of gravity ascribable to depression of the earth's crust." Now, Fischer, as well as Hann, states, that, upon the islands situated in the open ocean, the pendulum, when swung at the surface of the sea, executes at least nine and one-third more oscillations than upon the shores of the large continents. This, at the rate of one hundred and twenty metres for one oscillation, gives more than a thousand metres for the depression of the sea at the centre of the oceans; and this same conclusion is elaborated also by Listing as well as by Pinck. So startling is this disagreement, that we acknowl-

edge that it is almost beyond credence; and, as attention has been called to it, proper experiments should be undertaken to clear away all doubts.

But, even if we admit the correctness of the data given by M. Faye, there is one point in his theory which we cannot pass over, because it touches the constitution of the earth's crust. The eminent academician reasons somewhat in this way: at any point over the sea, the density of the water being sensibly inferior to that of rocks, there should be a local diminution of the attracting mass, and consequently the pendulum ought to oscillate less rapidly. Since this is not the result, there must be some cause counteracting the diminution of the superficial mass. This cause, according to M. Faye, can only be an increase of the density of the crust. As the solid rocks have in general a density greater than that of the molten materials from which they are obtained, and if under the sea the solidification has progressed farther than under the continents, the increase of the solid mass under the seas could compensate the diminution of density resulting from the column of sea-water above. But to this conclusion I am not ready to assent.

If it be true that a majority of bodies are more dense in the solid condition than in the liquid, it is also true that we know very little of the physical condition of the interior of the earth. Even in our day many *savants* hold that the earth is entirely solid. But, admitting the existence of a liquid interior covered by a solid crust, how can we assert that this crust, traversed by numerous crevasses, does not contain sufficient open spaces to annul the slight increase of density due to solidification.

Let us accept Faye's hypothesis for the time being, and search with him for the cause which has produced this increase of solidification. We know, from the submarine investigations of the last few years, that everywhere on the bottom of the large oceans there reigns a temperature in the neighborhood of 0° C. The cause of this is to-day well known. The water of the polar regions, rendered denser by cooling, sinks, and, following the bottom of the sea, tends to replace the water evaporated in the tropical regions. M. Faye says this cause for the cooling of the bed of the oceans has existed ever since there have been ice-caps at the poles, and that it is impossible that such an action, prolonged through a sufficiently long period, should not have affected the temperature

of the earth's crust beneath. This is the principle of his hypothesis, but it is not sufficient to announce it. It is also necessary to justify it in proving that the cause is adequate to the effect. This it is that M. Faye has neglected to do; and I would add, that, in my conviction, such a proof is impossible.

But, before attempting to show this, it would be well, perhaps, to call attention to one singular consequence, which is entailed if it is necessary to admit the theory of the cooling of the earth's crust by contact. No one is ignorant of the fact, that, if the temperature of the bottom of the sea is in the neighborhood of  $0^{\circ}$ , there are on the surface of the continents wide stretches of country which are still less favored. Without speaking of mountainous regions covered with perpetual snow, we will only mention the plains of Siberia, and especially that of the district of Yakootsk, where there reigns a mean temperature of  $-10^{\circ}\text{C}$ . This temperature, as may be readily seen, was established at the same time as the ice-caps around the poles, and has tended to produce a change of temperature of the crust for a time at least as long as that during which the cold waters have flowed over the ocean-bottoms: consequently, as the earth's surface affected by this cooling is far from being negligible, it is there that the pendulum ought to oscillate the most rapidly.

But, aside from this argument from the facts in the case, there are other strong reasons deduced from what we know of the bad conductive power of rocks. Experiments at Paris have shown that a change in the mean monthly temperature propagates itself in thirty-eight days to the depth of one metre, and that at ten metres below the surface all variation in the temperature of the air becomes absolutely insensible. This being the case, one would think that a cooling coming from the surface could hardly exercise any effect on the inside of the crust of the earth.

To argue the possibility of such a cooling effect, it would be necessary first to have some idea of the probable thickness of the crust. Whatever hypothesis we accept as to the interior constitution of the earth, it is inadmissible that, at the time when the glaciers took possession of the poles, the thickness of the solid crust had not reached at least twenty kilometres. Fossil botany teaches us that in the middle of the tertiary period the regions immediately around the poles possessed a rich vegetation of a character essentially temperate, which certainly could not have existed in the neighborhood of ice. The first appearance of polar ice was therefore not in the carboniferous period, when we know, moreover, that the arctic seas were inhabited by corals like those which now

live only in the tropics. This granted, if we take account of the generally given thickness of the gneiss and micascists, by all estimated at many thousands of metres; if we add to this the Cambrian, Silurian, Devonian, and carboniferous deposits, even attributing to them only a small part of the depth which they have in Europe,—we find that a total thickness of twenty thousand metres for the crust constitutes certainly a moderate valuation.

Let us suppose, then, a crust of twenty thousand metres, of which the temperature, about  $2000^{\circ}\text{C}$ . on its lower side, decreases regularly up to the surface, where it is about  $20^{\circ}\text{C}$ .,—the minimum of tropical regions,—or a diminution of one degree for ten metres. Can we imagine a difference of twenty degrees in the surface temperature could have produced an appreciable difference in the interior even after millions of years?

Let us consider more closely in what way the distribution of temperature exists in the interior of the earth. We know that this temperature increases constantly with the depth. But it has long been granted that the flow of heat does not contribute to the exterior temperature more than the thirtieth of a degree. Let us reverse the calculation, and ask how far a temperature of  $0^{\circ}\text{C}$ . could contribute to the diminution of heat which reigns at twenty kilometres depth. Cannot the answer be made without discussion?

But we have the reply expressed in figures in the results of some investigations in Siberia. In 1836 a merchant of Yakootsk, wishing to utilize the internal heat, dug a well in the hope of reaching water. In this well, dug to a depth of 115 metres, the temperature increased progressively from  $-10^{\circ}\text{C}$ . to  $0^{\circ}\text{C}$ .

The well was abandoned because such a great depth rendered it useless for the purpose proposed; but a little later, in the steppes of Katchongin, another well reached water at a depth of 126 metres. Therefore, below the constantly frozen surface of Siberia, the temperature rises in 126 metres at least ten degrees to  $0^{\circ}\text{C}$ . The increase is thus one degree for twelve metres and a half; that is to say, three times more rapidly than in the temperate regions, where it is one degree for from thirty-five to thirty-seven metres.

What, therefore, is to be concluded? Even that a great superficial cold only affects the layers immediately in the neighborhood of the surface, and that this influence at any considerable depth must become absolutely insignificant. If, then, the force of gravitation is not diminished above the oceans; if at the same time, on the authority of all others with the exception of M. Faye, there exists a sensible increase,—it is not to an increase

in the density of the crust that this result can be attributed. The only admissible explanation is a diminished distance to the attracting centre, and consequently a deformation of the ellipsoidal surface of the sea.

Hence I express my desire for further measures of great circles, following the suggestions of Bruns, the astronomical and geodetic observations to be combined with the most precise levellings and with measures of the force of gravity. Then only could the question be decided in a definite manner. Up to that time it is premature to wish to attack it, either by hypothesis in discord with the laws of science, or in passing over in silence the work, which, true or false, merits at least a respectful examination. A. DE LAPPARENT.

## II.

M. DE LAPPARENT's high authority as a geologist renders it my duty to give certain explanations in support of the partly geological theory which I have recently presented.

First, as regards the figure of the earth, it is not a question of authority taken second or third hand. The measurements of arcs of meridians are well known; and the calculation which permits us to conclude from these measurements the figure of the earth is very simple, and may be verified by any one.

The surface of the earth conforms so well in all parts with an ellipsoid of revolution, that the deviations are absolutely unappreciable, save by the most delicate measurements.

As regards the pendulum, with which the most recent measurements have been made by Mr. Clark of England, and in the United States by Mr. Peirce, the results are no less striking. These two reach by the same method of observation, wholly independent of the measurements of arc, and by calculations easily verified, the same flattening, 1:292.

It is very true, as M. de Lapparent has remarked, that, among the numerous observations made in all parts of the earth, those which have been made on the small isolated islands in the middle of the ocean have indicated a force of gravity a little too strong; but these slight anomalies do not vitiate the general result, that is to say, the value of flattening above given.

This fact has been known for seventy years, but it has been wrongly interpreted. Some have laid the blame upon the observers. Others have said, that, as the islands were of volcanic origin, the materials composing them have a greater density, which would account for the excess of local attraction. Others, fifty years ago, have

said, what M. de Lapparent repeats to-day, that, if the force of gravity is a little greater on the islands, it is because the surface of the sea is nearer the centre of the earth.

The true interpretation is less pretentious, and does not contradict assured scientific facts. It is simply that it has been forgotten to take into account the excess of attraction of the submerged mountains, at the summit of which observations were made, over the attraction of an equal volume of water, which it replaces in the middle of the sea. Unfortunately the navigators have not thought to determine by suitable soundings the form of the submarine pedestal on which their instrument was placed, so that it is impossible to-day to apply the necessary corrections to their results.

Finally, the chief argument of my opponent is the poor conductivity of the rocks which compose the earth's crust. I will say first, that, despite this feeble conductivity, the earth has become sufficiently cool in the course of the geologic ages to have acquired a solid crust of from thirty thousand to forty thousand metres in thickness. It follows, then, that the central heat traverses this thick crust, notwithstanding its slight conducting-power, to finally lose itself by radiation in space. I am unable to see that this undoubted cooling operates everywhere under the same conditions. Leave aside the argument of Siberia, and consider a spherical surface a league or a league and a half below the surface of the earth. At this depth it is necessary to distinguish two regions, — one situated beneath the continents, and the other found in the depths of the ocean. The central heat which arrives at this surface in the first region must still traverse an enormous bed of rock before it can radiate into space. Precisely on account of the slight conductivity of this highly protecting thickness of rock, very little heat passes; and there beneath our feet, at this depth, the central heat makes itself strongly felt, the temperature rising to more than 200° C. In the other region — the submarine region — the case is different. There the superincumbent bed, of a league and a half in thickness, is water; but water is an excellent transporter of heat when received from the bottom, the water carrying the heat upward, not by conduction so much as by the ascending currents, to which the least accession of heat gives rise. Thus the central heat passes easily in such a region. Moreover, the continual flowing-in of polar water at a temperature of  $-1^{\circ}$  or  $-2^{\circ}$  aids the refrigeration.

It therefore seems to me evident that the cooling of the central mass is facilitated by the sea, and

obstructed by the continents. Is it necessary to add that the waters of the ocean, under a pressure of from four hundred to six hundred atmospheres, penetrate deeply into the solid beds upon which the ocean rests, and render these beds more permeable to the heat? It is reasonable, and in no wise contrary to the laws of physics, to conclude that the cooling of our globe, elsewhere excessively slow, has progressed more rapidly and more deeply under the seas than under the continents. This difference has existed for many million years, and ought to have caused in that extent of time a notable variation of thickness in the solid crust.

H. FAYE.

#### BACTERIA AND DISEASE.

DR. GEORGE M. STERNBERG, U.S.A., so well known as a writer and investigator in bacteriology, delivered a lecture before the Alumni association of the Long Island college hospital, Brooklyn, on the evening of April 20. The subject upon which he was requested to address the association was, "A general review of the relation of bacteria to disease, including an account of a personal observation of Pasteur's methods in the prevention of hydrophobia, and their results."

The lecturer called attention to the frequent references of late to the labors of Pasteur in his inoculations for hydrophobia. While some of these willingly accorded to Pasteur all the honor he deserved, there were others which criticised adversely not only his methods, but even his professional reputation, charging him with acting the charlatan in keeping his methods secret. It is true that Pasteur has not proclaimed his experiments abroad in all their details; but this is not because he desired to keep them secret, but because he wished to satisfy himself that his methods were right before he encouraged others to undertake them. In this respect he has done what every scientific man would do. He has, however, always been ready to explain to those whom he regarded as competent his method, and even to demonstrate it to them.

The basis of Pasteur's method depending on increase in the virulence of the virus by transmission through a number of rabbits, and its use in gradually increasing potency in inoculation, has already been described in *Science*; and his system of protecting inoculation is too well known to call for further mention at this place.

Before Pasteur inoculated any human beings, he had tested his method upon fifty dogs, and had in every case rendered them immune, that is, insusceptible to hydrophobia. The history of the first person inoculated, Joseph Meister, is too well known to need repetition here. Since this time

(July, 1885), Pasteur has inoculated three hundred and fifty persons. Of course, Pasteur knows as well as any of his adverse critics that all these persons were not bitten by rabid dogs, but he could not refuse to inoculate them. With the exception of the Russians who have recently died, Pasteur has had but one unsuccessful result. In these cases the explanation is probably to be found in the fact that the inoculation was practised too late. It is just so in vaccination, which is recognized as a preventive of small-pox. If we can vaccinate in time, we may abort an attack of small-pox which would otherwise occur; while, if our vaccination is done at the close of the incubatory stage of the small-pox, it will be of no avail.

Dr. Sternberg read a translation of Pasteur's last communication to the French academy, published in the *Comptes rendus* of March 1. In this paper Pasteur gives the results of his inoculations, showing indubitably that the individuals operated upon had in most instances been bitten by rabid animals. These persons had come to him with certificates from medical men and veterinarians, showing this fact beyond a doubt. In speaking of his one apparent failure, Pasteur says that the child was not brought to him until thirty-seven days after the bite was received, and that the wounds in the axilla and the head were in themselves most serious, and that but for the sake of humanity he would have refused to treat the child for the hydrophobia.

Pasteur gives it as his opinion that one death from hydrophobia occurs in every six persons bitten, and that the disease is most apt to occur within forty or sixty days. Of the persons treated by him, one hundred were bitten more than seventy-five days before the publication of his communication, and were still well; another hundred had passed for six weeks to two months; and the others were still well, and time only could tell what would be the result in their cases.

In concluding his remarks upon hydrophobia and the methods of Pasteur, Dr. Sternberg said that the only criticism which suggests itself with reference to this interesting statement of facts is that Pasteur does not attach as much importance to the prophylactic value of early and thorough cauterization as this measure seems entitled to. The considerable number of cases in which cauterization was practised may have had a greater influence upon the favorable result in the extended series of cases reported than Pasteur has been willing to admit. At all events, it will be well to withhold our final judgment as to the value of the method as applied to man until the three hundred and fifty cases reported are all beyond

the limits of time within which the disease may develop, and especially until we have from Pasteur a satisfactory explanation of the failure in the cases of the three wolf-bitten Russians who have recently died of hydrophobia after having submitted to his treatment.

In discussing the relation of bacteria to disease, the lecturer stated, that, in response to a question of his, Pasteur had told him, that, although careful and persistent search had been made, no organism had been found in the hydrophobic virus, and that no difference could be detected between virulent and non-virulent spinal cords. An investigator in Geneva has recently claimed to have discovered the germ of rabies, but the claim lacks confirmation.

In contagious pleuro-pneumonia no germ has yet been discovered which can be considered as the specific micro-organism of the disease. Sternberg, Councilman, and Welch have lately been at work at the problem, but have as yet been unsuccessful.

In the pus of acute abscesses micrococci are invariably found. That the bacillus of anthrax, the spirochaeta of relapsing-fever, the bacillus of tuberculosis, all stand in an etiological relation to those diseases, there now seems to be no doubt. The dispute between the Germans and the English, as to the rôle played by the cholera bacillus in the production of that disease, is still unsettled. The bacillus of typhoid-fever, discovered by Ebert in 1880, is claimed by Koch to be the undoubted germ of that disease. His assistant, Gaffky, invariably finds it in the spleen of those who have died from the fever. Koch thinks that it forms spores. When introduced into the circulation of lower animals, it does not produce typhoid; but nothing can be argued from this, as we do not know that this disease ever affects animals other than man.

#### ACCURATE MOUNTAIN HEIGHTS.<sup>1</sup>

Of the various methods of determining the height of a mountain, the best is undoubtedly that of running a line of levels to its summit. This method is accepted as the standard, and as that by which the errors of the other methods are to be judged. A surprising degree of accuracy can be attained in levelling an ordinary country. Many of the errors compensate, and the final results should generally be accurate within a small fraction of a foot. In ascending a mountain, much greater deviations must be expected. The back sights are usually longer than the fore sights, and therefore errors in the adjustment of

the level or in the correction for atmospheric refraction are cumulative. The effect of the mass of the mountain on the level would produce an error which would not be compensated, and might be large enough to be appreciable. Finally, an error in the length of the levelling-rod would enter to its full proportionate amount. For these reasons much reliance should not be placed upon the fractions of a foot, unless the above sources of error have been considered and proper corrections applied. The precise heights as determined have, however, been given below. The labor and cost prevent its general application to the determination of mountain heights. A few lines of level have been run up the hills and mountains in this portion of the country [New England], generally by the enterprise and enthusiasm of volunteers. A description of several of these has been collected from various sources, in most cases from the local newspapers. The principal results are published below for permanent reference. Doubtless many similar measurements have been made, and it is hoped that they may be communicated to the writer as material for a second paper. As an example of the danger that such material may be totally lost, it may be mentioned that scarcely any of the results given below are contained in the excellent 'Dictionary of altitudes of the United States,' recently published by the U. S. geological survey.

The following table contains a number for reference, the name of the mountain or other object measured, and its height above the mean tide-level of the ocean. Additional information regarding many of these points is contained in the original article in *Appalachia*. Nos. 1 to 10 are taken from 'The geology of New Hampshire,' vol. i.; Nos. 11 to 17, from an article by Mr. J. J. Holbrook, *New Hampshire Sentinel*, Nov. 22, 1877, where the altitudes of several other points in Cheshire county, N.H., are also given. All of these stations are in New Hampshire; Nos. 18 to 43 are in Vermont, and Nos. 44 to 63 in New York.

| STATIONS.                                       | FEET.     |
|-------------------------------------------------|-----------|
| 1..Mount Washington .....                       | 6,293.000 |
| 2..Upper water-tank, Mount Washington railroad. | 5,800.000 |
| 3..Second tank (Jacob's Ladder).....            | 5,468.000 |
| 4..Waumbek Junction.....                        | 3,910.000 |
| 5..Ammonoosuc Station.....                      | 2,668.000 |
| 6..Halfway House .....                          | 3,840.000 |
| 7..Glen House .....                             | 1,632.000 |
| 8..Kearsarge (S.).....                          | 2,942.790 |
| 9.. " Garden.....                               | 2,622.500 |
| 10.. " Plumbago Point.....                      | 1,705.000 |
| 11..Monadnock.....                              | 3,840.300 |
| 12.. " Mountain House.....                      | 2,071.984 |
| 13..John Mann's, near divide.....               | 1,487.602 |
| 14..Jaffrey Schoolhouse No. 12 (threshold)..... | 1,231.227 |
| 15..Troy Schoolhouse No. 3 (lowest step).....   | 1,166.112 |
| 16..Beech Hill.....                             | 1,060.566 |

<sup>1</sup> From *Appalachia*, iv. 215.

| STATIONS.                                                    | FEET.     |
|--------------------------------------------------------------|-----------|
| 17..Beech Hill Reservoir.....                                | 594,589   |
| 18..Mount Mansfield (chin).....                              | 4,389,080 |
| 19.. " " (nose).....                                         | 4,056,390 |
| 20..Summit House.....                                        | 3,841,640 |
| 21..Ridge south-east of Summit House.....                    | 3,612,380 |
| 22..Halfway House.....                                       | 2,306,380 |
| 23..Junction of Notch Road.....                              | 1,291,850 |
| 24..Bench near J. Houston's.....                             | 955,050   |
| 25..Mansfield House, Stowe.....                              | 720,270   |
| 26..Methodist Church, Waterbury Centre.....                  | 712,530   |
| 27..Killington Peak.....                                     | 4,320,870 |
| 28..Summit of the second ridge.....                          | 3,546,310 |
| 29..Rock, summit of the first ridge.....                     | 3,335,480 |
| 30..Bench, rock near Manley's barn.....                      | 2,097,610 |
| 31..Bench, rock near R. Maxham's.....                        | 1,812,720 |
| 32..Junction of the mountain road, Sherburne.....            | 1,504,770 |
| 33..Hotel, Sherburne.....                                    | 1,211,210 |
| 34..Congregational Church, Bridgewater.....                  | 892,390   |
| 35..Mount Tom (north peak) Woodstock.....                    | 1,351,220 |
| 36.. " " (south peak) ".....                                 | 1,244,120 |
| 37..Little Killington.....                                   | 3,951,000 |
| 38..Base of the town hall, Woodstock.....                    | 697,690   |
| 39..Pico.....                                                | 3,935,000 |
| 40..Shrewsbury Mountain.....                                 | 3,707,000 |
| 41.. " Peak.....                                             | 3,838,000 |
| 42..Camel's Hump.....                                        | 4,077,000 |
| 43..Ascutney.....                                            | 3,163,000 |
| 44..Whiteface Mountain.....                                  | 4,871,655 |
| 45.. " " (spring).....                                       | 2,817,958 |
| 46.. " " (brook, second crossing on trail).....              | 2,023,965 |
| 47..Whiteface Mountain (brook, first crossing on trail)..... | 1,959,996 |
| 48..Lake Placid.....                                         | 1,863,715 |
| 49..Mount Marcy.....                                         | 5,344,245 |
| 50.. " " (hump).....                                         | 4,998,278 |
| 51..Lake Tear of the Clouds.....                             | 4,321,958 |
| 52.. " " " (summit of notch).....                            | 4,355,313 |
| 53..Panther Gorge.....                                       | 3,353,687 |
| 54..Mount MacIntyre.....                                     | 5,112,730 |
| 55..Mackenzie Pond Mountain.....                             | 3,789,322 |
| 56..Mount Skylight.....                                      | 4,889,626 |
| 57..Gray Peak.....                                           | 4,902,000 |
| 58..Haystack.....                                            | 4,918,626 |
| 59..Bartlett (west shoulder).....                            | 2,785,512 |
| 60..St. Regis Mountain.....                                  | 2,888,298 |
| 61..Lyon Mountain.....                                       | 3,809,000 |
| 62..St. Regis Lake (lower).....                              | 1,623,162 |
| 63..Raquette Lake.....                                       | 1,774,249 |

The height of Mount Washington was determined in 1853 by Captain Cram of the U. S. coast survey. Nos. 8 to 10 are from the carriage-road survey by Mr. R. S. Howe. Nos. 11 to 17 were levelled by Mr. J. J. Holbrook; and Nos. 18 to 26, by Mr. Hosea Doton, who started from the railway-station at Waterbury, and assumed the height of the top of the sleepers at that point to be 425 feet. Nos. 27 to 37 were determined in 1863 by Mr. Doton, who ran a line of levels, starting from White River Junction. The height of White River Junction was assumed to be 351 feet. Nos. 38 to 41 were determined trigonometrically from No. 27. No. 42 was levelled by Mr. Charles Collins at the time of the building of the Vermont central railroad; and No. 43, by Messrs. H. F. Dunham and D. C. Bell, from a bench in Harland. The bench appears to have been the summit of Garvin Hill. Nos. 44 to

63 are taken from the 'Seventh report of the Adirondack survey,' by Mr. Verplanck Colvin. No. 61 was not determined by levelling, but from the mean of two months' observation with the barometer.

E. C. PICKERING.

#### PROPOSED NEW TRADE OUTLET ON THE BLACK SEA.

THE Russian government has very recently, says *Engineering*, partially approved of a new scheme for doing away completely with commerce at Sebastopol, and diverting the stream of trade to Theodosia, at the eastern extremity of the Crimea. To achieve this it is projected to construct a railway, some eighty miles in length, from the Djanski station of the Lozova-Sebastopol line, and build a regular port at the Theodosian extremity. Of course, the building of the railway and port will be an expensive business, to say nothing of the inconvenience and loss incurred by the numerous merchants and trades-people, who will be compelled *bon gré mal gré* to transfer their operations from Sebastopol to Theodosia. But the Russian government never allows commerce to interfere with its military and naval plans; and certain high authorities having advocated the conversion of Sebastopol into a naval station, pure and simple, there is a probability that the rapidly increasing trade of the port will be summarily shifted to the other end of the Crimea. Such a despotic transfer is very little relished by the business-people of Sebastopol, to whom is really due the credit of having restored the place from a mass of ruins to a respectable town, and who have no inclination to have to repeat the process amidst the broken relics of Genoese, Turkish, and early Russian rule at Theodosia. Moreover, the port is a very inferior one compared with Sebastopol, being quite open to the sea; and although Chardin, when he visited the place two centuries ago, stated that there were more than 4,000 houses and 80,000 people in Theodosia, and 400 ships in the bay, it is not easy to believe that it was a very commodious port for shipping. In ancient times Theodosia was called Kaffa, and is reported by classic writers to have shipped as much as 3,000,000 bushels of wheat in one year, serving during the period in question as the 'granary of Greece.' In later times the Genoese did a large trade here; but the Turks knocked the place to pieces when they took it from the Genoese, the Russians again when they seized it from the Turks, and finally Hobart Pacha bombarded it in 1878. The population is about 10,000 souls, housed in hovels amidst a vast

expanse of ruins, and the town is about one of the dirtiest on the Russian shores of the Black Sea. Should the government carry out its plan, Kaffa will doubtless recover a deal of its ancient prosperity, but considerable time will be needed; and, in the financial condition of Russia, it is curious the government should burden itself with such an onerous task.

#### TOPOGRAPHICAL MAPS OF THE UNITED STATES.

A NUMBER of sheets of the topographic map of the country in preparation by the geological survey have lately been issued, and give good promise of the future. As to their accuracy it is impossible for any one person to speak, inasmuch as they come from many parts of the country; but, so far as they represent regions that the writer has chanced to visit, they give a satisfactory and characteristic illustration of their geography, and there can be little question that they will meet with general approval on this score. In regard to execution, they deserve hearty praise, as being decided improvements over certain maps previously issued. The sheets are about eighteen and one-half inches long by thirteen to fifteen inches wide, varying in the latter measure according to their latitude. Each one is bounded by even degrees or half-degrees, and is printed in three colors. The relief is indicated by brown contour lines for every fifty feet in the states, where the scale is 1 : 125,000, and for every two hundred and fifty feet in the western territories, where the scale is 1 : 250,000. The streams and lakes are in blue. The roads, towns, boundaries, and lettering are in black: the latter gives the name of the survey and that of the state or territory, and a special name for the sheet, at the top; latitude and longitude (from Greenwich), on the margins; scales, date of work, and names of persons or surveys in charge of the district, at the bottom; and names of counties, townships, towns, streams, etc., on the map itself. The mechanical execution of all this work is neat, clean, and accurate; and it is with a feeling of great satisfaction that we greet the appearance of so welcome an addition to our scanty store of these civilizing agents. We have as yet received no information as to the cost of the maps per sheet, but presume that they can be obtained singly and at moderate price; so that eventually—and not too far in the future—we may all have good maps of the region about us. The present edition contains several sheets for Montana, constructed from data received from the late Northern transcontinental survey; a good number for Utah, with

two for Arizona and Nevada, from work under the old Hayden, Wheeler, King, and Powell surveys, whose records are now, happily, thus consolidated; and a few others for Missouri, Texas, and Alabama, surveyed two years ago under the present organization. These last are especially interesting as revealing to us the topography of regions that have had too little attention during the last two decades of rapid western exploration.

#### THE COUNTRY BANKER.

MR. RAE's book consists of a series of informal talks about the business of an English country banker. There is hardly any thing about the general theory of banking, and little that is directly of value to the economist or student. The author simply gives a great quantity of practical advice to bank managers in the smaller towns of England,—whom they ought to give credit to, what securities to take, how to treat customers and clerks; and so on. The advice is confined exclusively to the particular audience he is addressing. Nothing is said about the practice and business of other kinds of banks; not even of the large London banks, except incidentally by way of contrasting their operations with those of country banks.

A great deal of the advice given is such as any shrewd and sensible man would give in any profession. The country banker is to be careful and circumspect, to watch his customers and his securities, to keep a good reserve, not to give too high salaries and yet to give sufficient salaries; and so on. It is not easy to see how such advice can be of much use to the persons to whom it is addressed. Rules of this kind are obvious enough: the difficulty is to apply them. Occasionally Mr. Rae gives something more concrete, as where he discusses the goodness of various kinds of securities, and the inferences to be drawn from a business-man's balance-sheet; and in these places bankers and money-lenders may find useful hints. But in the main one suspects the book will prove entertaining to that large class to whom banking and finance are an attractive mystery,—the people to whom a discussion of money and money-making and money-lending, and the handling of financial matters, has a fascination like that of the big bars of solid gold to the sight-seers at the mint. And to such persons, as well as to the general reader who wants to know something of the routine of banking, the book can be recommended. It is sound, sensible, and clearly and fluently written.

*The country banker.* By GEORGE RAE. With a preface by Brayton Ives. New York, Scribner, 1886. 12°.

Incidentally one gets interesting glimpses of English habits. Thus the habit of cutting bank-notes in two, and transmitting the two halves in separate envelopes by post,—to guard against loss or theft in transmission,—still exists. Mr. Rae advises managers not to issue notes to “any one who, you have reason to suspect, would straightway cut them in halves, and despatch them by the first post as a remittance to London.” And notes of local country banks are sometimes preferred by people in rural parts to Bank-of-England notes. Ignorance and prejudice of this kind on monetary matters are possible only in a rather stolid and slow-moving community like that of rural England. Again, the country banks handle deposits in a way differing from methods in this country. They charge an eighth of one per cent on all transactions, whether of money deposited or checks cashed. On the other hand, they allow to depositors interest on their accounts from day to day, at the rate of from two to two and one-half per cent. No such practice, we believe, exists in London or in this country. The expense of handling an account, and the gain from deposits, are allowed to offset each other,—a rough-and-ready but simple process. The more punctilious arrangement of the English country banks is characteristic of their general business habits.

F. W. TAUSSIG.

#### PHILOSOPHICAL QUESTIONS OF THE DAY.

THE reader who has no previous acquaintance with Von Hartmann cannot be advised to begin with this volume; but whoever has a moderately good knowledge of the great pessimist's views and methods will find these brief essays both instructive and amusing. Von Hartmann here uses all his well-known dialectic arts, sets his various opponents to fighting among themselves with all his old, somewhat trite but always charming ingenuity, parades for the reader's benefit a large part of his imposing and finely drilled terminology, and retells in his pleasing way much of his philosophical romance. The tireless activity, the immense reading, the skilful writing, and the attractive personality of the author are all freely displayed. Nobody else in this generation can do what Von Hartmann has done: so much is clear. Nobody else can make both pessimism and abstract metaphysic so popular; nobody else can join such a talent for advertising with such a genuine speculative genius; and to nobody else has Heaven granted such various talents, literary, commercial, scientific, journalistic, philosophical,

and quasi-philosophical. Whether the result of the use made of these powers in Von Hartmann's case has been to produce a philosophy, every reader must judge for himself as he can. For our part, we can make nothing of the outcome, in so far at least as it is Von Hartmann's. His stubborn insistence upon giving to his account of the absolute the form of an historical romance is his most characteristic and fundamental philosophical blunder. One cannot regard even elementary geometry as a story: its truths are contemporaneous. How much less, then, can an incoherent narrative, such as Von Hartmann gives of the ‘weltprocess,’ exhaust or even fairly begin an exposition of the philosophy of the absolute, in case, namely, there is any philosophy of the absolute possible at all? And as for Von Hartmann's pessimism, this whole conception of a balance-sheet of pleasures and pains as a test of the value of life seems to us unpsychological, and opposed alike to the common sense of mankind and to the demands of speculative thought upon ethical problems. Deeper truth there indeed is in Von Hartmann's writings, and much of it; but, so far as our knowledge of his works goes, this deeper truth represents rather the common property of idealists than any creation of Von Hartmann's. But one thing, at least, must be admitted by the unkindest of critics; viz., that if there is in Von Hartmann, as we must hold, only the spoiling of a philosopher, our pessimist still remains one of the best philosophers ever so completely spoiled.

Of the twelve essays in this volume, all brief and all interesting, the most valuable, to our mind, are the first, ‘Die schicksale meiner philosophie in ihrem ersten jahrzent;’ the fourth, ‘Uebersicht der wichtigsten philosophischen standpunkte;’ the fifth, ‘Zur pessimismus-frage;’ the sixth, ‘Zur religions-philosophie;’ the tenth, ‘Die grundbegriffe der rechtsphilosophie;’ and the eleventh, ‘Kant und die heutige erkenntniss-theorie.’ Of these, the first is by far the most directly and universally attractive, because it brings Von Hartmann's personality to the front most of all, and is a fine example of his frequently used device of joining the methods of autobiography with those of metaphysic, to the great advantage of the general reader, if not to the advantage of his philosophy itself.

JOSIAH ROYCE.

THERE have been but sixty cases of death from hydrophobia in Philadelphia during the past twenty-five years, the largest number, seven, occurring in 1869.

*Philosophische fragen der gegenwart.* Von EDWARD VON HARTMANN. Leipzig und Berlin, *Friedrich*, 1885. 8<sup>c</sup>.